THE CLAIMS

What is claimed is:

1. A method comprising:

adjusting a phase of an interferometer to reduce the power of an added or dropped signal;

adjusting a waveguide reflection band to select a wavelength of said added or dropped signal; and

adjusting the phase of said interferometer to increase the power of said added or dropped signal.

2. The method of Claim 1 wherein adjusting said waveguide reflection band is accomplished by changing an index of refraction of the waveguide.

3. The method of Claim 2 wherein adjusting said waveguide reflection band is accomplished by heating silica comprising the waveguide.

4. The method of Claim 1 wherein adjusting said waveguide reflection band is accomplished by changing a grating period of the waveguide.

5. The method of Claim 1 wherein adjusting the phase of said interferometer is accomplished by changing a length of an arm of the interferometer.

6. The method of Claim 1 wherein adjusting the phase of said interferometer is accomplished by changing an index of refraction of the interferometer.

7. The method of Claim 6 wherein adjusting the phase of said interferometer is accomplished by heating silica comprising the waveguide.

8. The method of Claim 1 further comprising:

    adjusting the phase of said interferometer to direct any wavelength reflected to an express port while adjusting the waveguide reflection band to select the wavelength of the added or dropped signal.

9. An apparatus comprising:

    a waveguide grating to select a wavelength of an added or dropped signal; and

    an interferometer to control the power of said added or dropped signal.

10. The apparatus of Claim 9 wherein said waveguide grating is written in said interferometer.

11. The apparatus of Claim 10 wherein said waveguide grating is a Bragg grating.

12. The apparatus of Claim 11 wherein said interferometer is a planar lightwave circuit Sagnac interferometer.

13. The apparatus of Claim 9 further comprising:

a first set of heaters to adjust a reflection band for the waveguide grating; and

a second set of heaters to adjust a phase for the interferometer.

14. The apparatus of Claim 9 further comprising:

a first optical circulator coupled with said waveguide grating and said interferometer to receive input signals for said waveguide grating and said interferometer and to receive express signals from said waveguide grating and said interferometer; and

a second optical circulator coupled with said waveguide grating and said interferometer to receive added signals for said waveguide grating and said interferometer and to receive dropped signals from said waveguide grating and said interferometer.

15. An apparatus comprising:

an interferometer to control the power of an added signal or a dropped signal, the interferometer including an optical waveguide grating to select a first wavelength channel of the added signal or the dropped signal and to filter the dropped signal from an input data stream and to multiplex the added signal into an output data stream, a phase of said interferometer being adjusted to provide hitless optical add-drop multiplexing when a reflection band of said waveguide grating is being adjusted to select said first wavelength channel.

16. The apparatus of Claim 15 further comprising:

a set of heaters operatively coupled to the interferometer to adjust the reflection band of the waveguide grating or the phase of the interferometer.

17. An apparatus comprising:

a Sagnac interferometer comprising a waveguide grating to select a wavelength of an added or dropped signal; and

a phase adjustment circuit coupled with said Sagnac interferometer to control the power of said added or dropped signal.

18. The apparatus of Claim 17 wherein said waveguide grating is a Bragg grating.

19. The apparatus of Claim 17 wherein said waveguide grating is distributed.

20. The apparatus of Claim 17 wherein said phase adjustment circuit comprises a heater.

21. The apparatus of Claim 17 wherein said phase adjustment circuit is piezoelectric.

22. The apparatus of Claim 17 further comprising:

a frequency adjustment circuit coupled with said waveguide grating to tune the frequency of said added or dropped signal.

23. The apparatus of Claim 22 wherein said frequency adjustment circuit comprises a heater.

24. The apparatus of Claim 22 wherein said frequency adjustment circuit is piezoelectric.

25. The apparatus of Claim 17 further comprising:

a frequency adjustment circuit coupled with said waveguide grating to tune a reflection band of said waveguide grating to select the wavelength of said added or dropped signal; and

a phase adjustment circuit coupled with said Sagnac interferometer to provide hitless optical add-drop multiplexing when the reflection band of said waveguide grating is being tuned.

26. A system comprising:

a first port to receive an input wave-division multiplexing (WDM) data stream including a plurality of wavelength channels;

a second port to output an express WDM data stream including said plurality of wavelength channels;

a third port to receive an added signal of a first wavelength channel of said plurality of wavelength channels;

a fourth port to output a dropped signal of the first wavelength channel; and

a Sagnac interferometer to control the power of said added or dropped signal, said Sagnac interferometer comprising an optical waveguide grating to select the first wavelength channel of said added or dropped signal and to filter said dropped signal

from the input WDM data stream and said added signal to the express WDM data stream.

27. The system of Claim 26 wherein a phase of said Sagnac interferometer is adjusted to direct a signal of any wavelength channel selected by said optical waveguide grating from the input WDM data stream to the express WDM data stream while a reflection band of the optical waveguide grating is being adjusted to select the first wavelength channel.

28. The system of Claim 26 wherein said optical waveguide grating is a tunable Bragg grating.

29. An apparatus comprising:

a Sagnac interferometer including a beam-splitting coupler;

a Michelson interferometer including said beam-splitting coupler and a waveguide grating to reflect a first wavelength; and

a phase shifter coupled with said Michelson interferometer to adjust the interference of the first wavelength at said beam-spitting coupler between a destructive interference and a constructive interference.

30. The apparatus of Claim 29 wherein said waveguide grating is tunable.

31. The apparatus of Claim 30 wherein said waveguide grating is a Bragg grating.

32. The apparatus of Claim 30 wherein said waveguide grating is segmented.

33. The apparatus of Claim 29 wherein said Sagnac interferometer is a planar lightwave circuit interferometer.

34. The apparatus of Claim 33 wherein said Michelson interferometer is the same planar lightwave circuit interferometer.

35. The apparatus of Claim 34 wherein said planar lightwave circuit interferometer comprises a quartz glass waveguide. .

36. The apparatus of Claim 34 wherein said planar lightwave circuit interferometer comprises a silicon resin waveguide

37. The apparatus of Claim 29 wherein said phase shifter is a thermo-optic phase shifter.

38. The apparatus of Claim 29 wherein said phase shifter is a stress-optic phase shifter.

39. A wave-division multiplexing (WDM) system comprising:

a plurality of Sagnac interferometers, each of said plurality of Sagnac interferometers respectively comprising a waveguide grating to reflect a wavelength of a respective

added or dropped channel and a phase adjustment circuit coupled with said Sagnac interferometer to control the power of said added or dropped signal.

40. The system of Claim 39 wherein a respective phase of each of said plurality of Sagnac interferometers is adjustable to direct signals of any wavelength reflected by said waveguide from an input WDM data stream to an express WDM data stream while a reflection band of the waveguide grating is being adjusted to reflect the wavelength of the respective added or dropped channel.